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voted to the several departments in which research work is conducted is surprisingly large. The study of all questions bearing directly upon the anatomy and finer histology of the brain is carried on in a perfectly equipped laboratory. Two smaller adjoining rooms are reserved for the use of the director of the laboratory. Seven rooms are set apart for the use of those who are engaged in following lines of work in experimental psychology or physiology, while separate quarters have been assigned to both the clinical and chemical laboratories. Among the more interesting items of the new equipment noticed in the psychological department was an elaborate, but exceedingly ingenious, apparatus for the exact measurement of the pupillary reactions in response to light, sound and smell stimuli.

A word may be said with reference to the duties of the director of the clinic, who is also professor of psychiatry in the university. His word as to what patients shall or shall not be admitted to the clinic is final and he may, at any time he thinks proper, discharge or have a patient transferred to an asylum.

Although not forbidden to engage in private practise, it is expected that the director's time will be chiefly occupied in teaching students, supervising the work done in the various laboratories and in carrying on scientific investigations. The fact that professorships of psychiatry in Germany are in the true sense of the word academic positions, enables the director of a clinic to keep *au courant* with his profession, to have more time for study, and is thus fitted to be a more stimulating teacher and more intelligent investigator than is possible in those countries where the alienist devotes most of his energies to administrative duties or to private practise.

The incalculable advantage of having a director of a hospital who, not only by precept, but also by practise, encourages his assistants and students to undertake the solution of new problems is of the greatest importance.

The American who visits the Munich clinic and takes a comprehensive view of the great forward movement in medicine to which this institution is a monument may well ask himself the question, How long will our leading

universities be without adequate means and opportunities for the organized systematic study of the most important organ of the body, whose functions professors and teachers seek to train? The most liberal contribution from a private individual that has yet been made in Germany to an institution devoted to the study of the brain was that of Herr Krupp, the maker of big guns. This far-sighted and philanthropic man saw that the time had come when the study of the brain of the man behind the guns was a matter of the greatest importance to the German empire, and with this aim in view he not only founded, but endowed, the Neurobiological Institute in Berlin. This institution has for its sole object the investigation of various problems connected with the structure and functions of the nervous system, and, although deserving a fuller description, is briefly referred to here, in order to direct attention to the widespread interest that these questions are receiving in Germany.

STEWART PATON.

STANDARD TIME IN AMERICA.

THE annual report of the Superintendent of the U. S. Naval Observatory for 1904 has stated on page 14 that the adoption of the standard time system of this country is the outgrowth of the efforts of the naval officers on duty at that institution.

The more detailed history of this interesting subject is about as follows: The astronomers in charge of the numerous observatories of this country (usually connected with universities) have always felt the necessity of contributing their quota to the public welfare, and whenever possible have regulated the local public clocks and the time systems for the local railroads. This work began with the labors of W. C. Bond (1820-1860), whose private observatory in Boston developed into the magnificent Harvard College Observatory at Cambridge. Bond not only regulated the time furnished to the shipping in Boston and to jewelers and that shown by the public clocks, but also especially the clocks of the railroads centering in that city. About 1840 Professor O. M. Mitchell began to regulate from the Cincinnati Observatory the time used by the

railroads in that city, and the work was continued by Twitchell, Davis, Abbe, Stone and Porter. About 1855 the Dudley Observatory at Albany undertook the control of the time of the New York Central Railroad, and its work was kept up by Hough, the U. S. Signal Service and Boss. About 1867 the Allegheny Observatory began regulating the time of the railroads centering in Pittsburg, and Wadsworth and Keeler kept up this work of Langley. In Chicago, beginning with 1865, Professor T. H. Safford regulated the time system from the Chicago Observatory. About 1850 a time ball was established on the U. S. Naval Observatory at Washington, and by 1870 telegraphic communication had been established between it and some of the government buildings in that city. About 1880 the Yale College Observatory, under Dr. Leonard Waldo, established a bureau of standard time for the state of Connecticut.

In all the preceding cases each observatory sent out its own local mean time as the standard for local use, and also gave the railroads whatever standard time they might require for their use. Local standard times were also furnished to the vessels in the ports at Boston, New York, Washington and elsewhere, and the navigators obtained Greenwich time by adding the corresponding difference of longitude. At that date no one seems to have thought it practicable to distribute a uniform standard of time for public use.

In 1870 General A. J. Myer, in organizing the telegraphic service of the Weather Bureau, required that all observations and telegraphy for the tridaily weather maps should be done simultaneously on the time proper to the meridian of Washington, while another set of observations was kept up for climatological purposes on local time. In 1871 the simultaneous work was, by mutual consent, extended to the vessels at sea, and in 1873 to observers of all nations throughout the world; all simultaneous records that were made for the Signal Service and published in the Bulletin of International Observations were originally made at 7:30 A.M. Washington, or 12:43 P.M. Greenwich, standard time.

About 1878 corresponding simultaneous work

was ordered to be done on the U. S. naval vessels. In the course of his study of observations of the aurora of April, 1874, Professor Abbe had occasion to state that much trouble arose from the fact that the numerous correspondents had used such a great variety of standards of time, many of which could not be identified at all; that the words 'railroad time,' 'local time,' or 'standard time' seemed to have no definite meaning, and that when several railroads passed near an observer it was really impossible to ascertain what particular railroad time was adopted by him. In May, 1875, he requested the president of the American Metrological Society, Dr. F. A. P. Barnard (president of Columbia University), to consider whether the reform of standard time could not properly engage the attention of that society. The society at once appointed Professor Abbe chairman of a committee to consider that subject, and his reports are published in the proceedings of the society for May, 1879, and subsequent years. The position was taken that Greenwich standard time and Greenwich longitude should be adopted. But before making the detailed report it seemed necessary to arouse public opinion on the subject, and numerous articles were published by himself and friends in the daily papers, monthly magazines and scientific journals. Eventually the full report of the committee, a pamphlet of twenty-seven pages, was published in May, 1879, in which the existing state of confusion and the beauty of a simple, practical system of standard meridians at even hours east or west of Greenwich were set forth.

It recommended most positively the schedule of standard hour meridians now in use; it also urged that one standard would be still better and equally practicable. The publication of this report brought out the fact that Professor Charles F. Dowd, Mr. Sanford Fleming and Mr. W. F. Allen, secretary of the General Time Convention of Railroad Officials, had also thought along similar lines. It was evident that such a radical change from current practise could best be initiated by the railroad companies as the committee had reported. Accordingly, after a consider-

able discussion in the public press, which the committee encouraged in order to bring out all possible objections and as a matter of public education, it requested the president of the Metrological Society to recommend the suggestions in this report to the consideration of the General Time Convention.

Mr. Allen now took up the subject with renewed energy. By two years of intense discussion and correspondence he was able to enlist the majority of the railroads in support of the Greenwich hour system. The success of the reform rested wholly with him. President Barnard distributed widely the various circulars of the American Metrological Society on standard time. The chief signal officer, General William B. Hazen, adopted the idea of the proposed reform with the greatest enthusiasm. The signal office had already found it necessary to instruct some of its men in the astronomical methods of determining time, and its observers at Dudley Observatory and elsewhere, in addition to their regular meteorological duties, were now regulating local time and even local railroad time when no special astronomers were available for that purpose. In order that the standard of time sent to signal service observers daily should be correct to the nearest second, so that such miscellaneous observations as atmospheric electricity, auroras, thunder storms, earthquakes, meteors, might not be deficient in accuracy, Professor Frank Waldo suggested the plan and General Hazen authorized what might be called a general clearing house for all the astronomical observatories that wished to cooperate with him. It was arranged that an early morning signal should be telegraphed, say at 11 A.M., and automatically recorded by the chronograph and clock of the Signal Service at Washington. Among these signals some would always be very accurate because the respective observatories had clear weather and had just made a good time determination during the preceding night, while others would be relatively inaccurate because of cloudy weather at the respective localities where the observatories had been necessarily relying upon their clock rates for several days. By combining all these into one general mean

giving appropriate weights it thus became possible to send back to each observatory a statement as to how much its own clock was in error as compared with the mean of all throughout the country. Such a beautiful system as this might with propriety have been inaugurated by any astronomical observatory, but an extensive correspondence had shown that the signal service was the only institution with which all the observatories and astronomers were disposed to cooperate in this work.

That some such plan was, and is now, desirable is shown by the fact that a comparison of the standard time signals of the U. S. Naval Observatory, the Harvard College Observatory and the Alleghany Observatory, made each day during several years at New York by the Western Union Telegraph Company, showed large differences, amounting to as much as five seconds in some few cases and frequently exceeding two seconds.

Unfortunately, however, in 1884, shortly before the clearing-house system was to go into operation, some evil-minded person seems to have induced the secretary of the navy to believe that the Signal Service, in its desire to secure accurate time, was exceeding its own legitimate duties, and an order came from the secretary of war forbidding further action, and even requiring the removal of the elegant clock from its ideal location in the basement of the War Department building. This was the first clock in this country to be so mounted that the air pressure and the air temperature to which it was subjected would remain constant. The country was thus deprived, at least temporarily, of the prospect of obtaining the most accurate possible time service for the use of both astronomers and the public, and the U. S. Naval Observatory continued its struggle against the use of standard hour meridians.

Meantime, however, Mr. Allen had induced the railroads to agree that his standard hour system should go into effect on the eighteenth of November, 1883. In order to realize this result it was necessary that the observatories giving time to the railroads and local communities should change to the new system of hour meridians. This change in public clocks and

by the railroads was to be made during the morning of the eighteenth, but a few days before that Mr. Allen wrote Professor Abbe, saying that he feared some embarrassment if the Harvard College Observatory should fail to change its public time signals, as the director of the observatory was absent from the country. Accordingly, a telegram from General Hazen to President Eliot urged that by reason of its eastern longitude Harvard College and New England should have the honor of thus beginning the desired reform. The people as well as the railroads of New England began the good work on that Sunday morning.

By an agreement with the Western Union Telegraph Company, made about 1877, that company sold its time signals received from the Naval Observatory to its customers throughout the country who would pay for them. This was, probably, the only case in which a government institution cooperated with a corporation to sell that which would seem to be government property and without any return to the Treasury. Of course the telegraph companies made equivalent returns to the government by allowing the free use of their lines for longitude purposes, but it seemed rather hard that this last concession, which had been in effect since 1845, should be used as an argument for maintaining a popular distribution of time signals that cut under or competed with the work of local astronomical observatories. Of course on November 18, 1883, at the request of the telegraph company the Naval Observatory began sending signals on the 75th standard for transmission to the railroads, but its own time-balls and signals for use in Washington city continued to be regulated by Washington local mean time until March 1, 1884.

In conclusion it may safely be said that the adoption of the present system of standard hours, with all its manifold advantages, has been accomplished by persons outside the government service. The officials of our railroads have lately united in ascribing the successful introduction of standard time to Mr. W. F. Allen, without saying a word in favor of the Naval Observatory's pretensions.

SCIENTIFIC NOTES AND NEWS.

DR. GEORGE F. KUNZ, of New York City, has been appointed by the State Department a delegate to the International Congress for the Study of Radiology and Ionization, which will be held in Liège, Belgium this month.

WE learn from the *American Geologist* that Professor T. C. Chamberlin has been appointed a member of the Illinois Geological Survey Board. The other members are *ex-officio* Governor Deneen and President James, of the State University.

MR. E. C. CHILCOTT, agronomist of the South Dakota Agricultural Experiment Station, has been appointed expert in connection with the cereal work of the Department of Agriculture.

DR. WALTER SCHILLER has been appointed head of the geological division of the Museo de la Plata and geologist of Buenos Ayres.

ON the occasion of the installation of Mr. Andrew Carnegie as lord rector of St. Andrew's University on October 17, the university will confer the honorary degree of doctor of laws on Mr. Carnegie; Mr. Whitelaw Reid, the American ambassador to Great Britain; Mr. Charlemagne Tower, the American ambassador to Germany; Bishop Potter of New York; Dr. Nicholas Murray Butler, president of Columbia University, and Dr. William J. Holland, director of the Carnegie Museum at Pittsburg.

A MEMORIAL in honor of Professor Friedrich von Esmarch, the eminent surgeon of the University of Kiel, has been erected in his native place, Tönningen in Schleswig-Holstein. Professor von Esmarch was present at the unveiling, which took place on August 6.

M. VIDAL DE LA BLACHE has received the medal of the Paris Geographical Society in recognition of his work, 'Tableau de la Géographie de la France,' which is the introduction to the 'Histoire de France,' published under the direction of M. E. Lavisse.

SECRETARY WILSON has made public the report of Solicitor George P. McCabe on the investigation of the charge that Dr. Daniel E. Salmon, head of the Bureau of Animal